DTE Energy Company
One Energy Plaza, Detroit, MI 48226

DTE Energy

January 20, 2015

Mr. Tarek Buckmaster
Lakes Erie and Huron Permits Unit
Michigan Department of Environmental Quality
525 West Allegan
Lansing, Michigan 48909

Re: NPDES Permit Renewal Application Revision
DTE Electric Company – Monroe Power Plant (MONPP)
NPDES Permit No. MI0001848

Dear Mr. Buckmaster:

The DTE Electric Company (Company) is submitting a revision to the NPDES permit renewal application dated April 4, 2014, for the above-reverenced facility. This revision is based on your e-mail request dated November 26, 2014, and pertains to Section VI (Cooling Water Intake Structures, or CWIS) of the renewal application. The original application provided the information by referencing the *Report on Source Water and Cooling Water Data and Impingement Mortality and Entrainment Characterization for Monroe Power Plant* (Characterization Report), dated July 2008. This comprehensive report was previously submitted to the MDEQ at the time it was written. We understand that your request is based on the additional information that the Characterization Report did not provide.

This revision will address each request separately, followed by the Company's response. Your requests are paraphrased from Section VI of the original permit renewal application.

Request and Company Responses

1. **Provide a narrative description of the operation of each of the CWIS (include intake flows {~~design~~ and actual}, daily hours of operation, days of operation per year, seasonal changes in operation, debris removal system operations, and any changes in operation the facility has implemented to reduce intake flows or IM and E).**

   As stated above, the renewal application referenced the Characterization Report, dated July 2008 as a source of information for Section VI. Enclosure 1 provides a) Section 2.2 of the Characterization Report, which describes the CWIS, and b) supplemental information, which describes intake flows and CWIS operation.

2. **Provide a narrative description of the operation of the cooling water system (~~describe its relationship to the CWIS, the proportion of the design intake flow that is used in the system,~~ the number of days of the year the cooling water system is in operation, seasonal changes in the operation of the system, and any anticipated changes).**

   Enclosure 1 provides a) Section 2.3 of the Characterization Report, which describes the Cooling Water System (CWS), and b) supplemental information, which describes CWS operation.

3. **Provide the calculation of the maximum design through-screen intake velocity (the applicant may also submit the maximum actual through-screen velocity). {You should submit both velocities. For your facility, I suggest that you calculate these velocities at the traveling screens, the trash racks, and the intake canal.}**

   Calculations are provided on Enclosure 2.

If you have any questions or desire additional information, please contact me at (313) 235-5569, or via email at chueyn@dteenergy.com.

Sincerely,

DTE Energy Corporate Services, LLC

Nicholas J. Chuey

Nicholas J. Chuey
Senior Environmental Engineer
Environmental Management & Resources

Enclosures

Cc: Ms. C. Alexander – MDEQ, Lakes Erie and Huron Permits Unit
Ms. J. Krejcik – MDEQ, Jackson Michigan District

ENCLOSURE 1

Section 2 from the Characterization Report and Supplemental Information

The location of the HZI-line within Lake Erie will change with varying River Raisin flows, wind conditions, varying lake water levels, and changes in lake bottom elevations (associated with sediment deposition and dredging activities), and therefore, with time. Under extreme low River Raisin flows, the HZI will increase and the HZI-line will move away from the shoreline. The maximum $\boldsymbol{R_{HZI}}$ value based on no River Raisin flow and low mean ambient velocity is 1,444 ft (Table 2-2). Consequently, outside the HZI-line defined by these conditions, the probability of entraining non-motile organisms remains low most of the time (Figure 2-5). Under moderate River Raisin flow conditions (average mean annual flow), the HZI will decrease and the HZI-line will move closer to the shoreline (Figure 2-5). The minimum $\boldsymbol{R_{HZI}}$ value based on a moderate River Raisin flow and a high mean ambient velocity is 367 ft (Table 2-2). Consequently, inside the HZI-line defined by these conditions, the probability of entraining non-motile organisms remains high most of the time (Figure 2-5). Between these HZI lines defined by combined low River Raisin flows and low wind-induced velocities or combined moderate River Raisin flows and high wind-induced velocities, the probability of entraining non-motile organisms is moderate and variable.

2.2 Cooling Water Intake Structure Data

2.2.1 Configuration

Water used for once-through cooling at the Monroe Power Plant is withdrawn from the River Raisin and Lake Erie through an intake canal approximately 700 ft long with a width between 36 ft and 107 ft (Figure 2-6). The canal branches to provide a water source to the two screenhouses, SH1 and SH2 (Figure 2-6). Each screenhouse is divided into two cells, each with four screenwells, which serve individual units. SH1 serves Units 1 and 2, and SH2 serves Units 3 and 4 (Figure 2-6).

Each screenhouse contains a skimmer wall, trash racks, traveling screens, circulating water pumps, warm water recirculation canals, and chlorine diffuser as described below (Figures 2-7 and 2-8). The following sections detail the various components of the CWIS structure.

2.2.2 Skimmer Wall

A concrete skimmer wall is located perpendicular to the intake water flow, approximately 20 ft downstream from the trash racks and 10 ft upstream of the traveling screen (Figures 2-7 and 2-8). It extends from the floor line of the screenhouse to approximately 14 ft from the bottom of the intake canal. This skimmer wall prevents the passage of ice and large floating objects into the plant intake.

2.2.3 Trash Racks

Each screenhouse contains eight trash racks located upstream of the traveling screens (Figures 2-7 and 2-8). Each trash rack is 11.7 ft wide and consists of vertical parallel steel bars that are spaced 3 inches (in.) apart to prevent large debris and foreign objects from entering the screenhouse.

2.2.4 Traveling Screens

Each intake screenhouse contains eight vertical traveling screens manufactured by the Link-Belt Company (Figures 2-7 and 2-8). Each screen is 10 ft wide and mounted on approximately 34-ft centers. The screen surface consists of 10-ft-by-2-ft panels fitted with stainless steel wire screen cloth with 3/8-in. square openings. The screens are operated automatically on an intermittent basis depending on the pressure differential.

2.2.5 Rescue Fish Pump

A fish rescue (pump) system that had been installed several years ago is no longer operating because of its deteriorated condition.

2.2.6 Circulating Water Pumps

Twelve main circulating pumps (three for each unit) manufactured by the Ingersoll-Rand Company are located in the intake screenhouses downstream of the traveling screens and general service water (GSW) pumps. Each pump is a fixed speed, vertical, non-pullout, single-stage, submerged wet pit type with a rated capacity of 116,500 gallons per minute (gpm). In addition, six general service pumps (three for each screenhouse) manufactured by Layne and Bowler supply a capacity of 5,000 gpm each. If all pumps were operational at maximum design capacity, the Monroe Power Plant could withdraw 1,428,000 gpm from the River Raisin and Lake Erie. The number of pumps operating varies with season and unit availability (Figures 2-9 and 2-10).

Screenhouse/Unit	**Pump Capacity (gpm)**
SH1	
Unit 1	3@116,500
Unit 2	3@116,500
Service Water	3@5,000
SH2	
Unit 3	3@116,500
Unit 4	3@116,500
Service Water	3@5,000

Condenser Circ.	1,398,000
Service Water	30,000
Total	**1,428,000**

2.2.7 Flow Distribution

The maximum design intake flow for the Monroe Power Plant is 2,056.32 MGD, which represents four times the mean annual flow of the River Raisin (Figure 2-9). The facility's flow distribution and water balance are depicted in Figure 2-11.

2.3 Cooling Water System Data

2.3.1 Operation

The condenser cooling water from all four units is discharged to a common overflow canal, approximately 1,000 ft long with varying widths and constant bottom elevation. Just north of the East Front Street Bridge, the overflow canal terminates at the recirculation gates. At this location, the thermal discharge can be directed either south through the discharge canal (approximately 5,800 ft long and 560 ft wide) to Lake Erie or north through the MacMillan Road canal (approximately 1,400 ft long and 160 ft wide) to the River Raisin.

2.3.2 Recirculation System

In order to prevent icing at the screenhouses during the winter, a portion of the heated effluent is used to increase the intake water temperatures. Approximately 20 percent of the discharge condenser cooling water can be directed through the MacMillan Road canal to the intake canal via the Raisin River. Additional cooling is not provided at the Monroe Power Plant.

Supplemental Information –
Cooling Water Intake Structure (CWIS) Operation

Actual Flows
The intake flow is reported to be **1,539 million gallons per day (MGD)**. This value is based on an average of the flows provided in the Water Use Reports for the years 2011, 2012 and 2013.

Hours of Operation
MONPP operates every day of the year, 24 hours per day. The CWIS must be in operation when the plant is operating.

Seasonal Changes in Operation
Although the plant electrical output can fluctuate with the seasons, customer demand is the primary driver for electrical output. Flow through the CWIS does fluctuate with the seasons; it is lower in the colder months and higher in the warmer months. For example, intake flow was reported to be 1,288 MGD in February 2013, and 1,932 MGD in August 2013. The primary reason for the difference is based on the number of intake circulating water pumps that are in operation for each of the four units. The number of traveling screens in operation depends on the number of intake circulating water pumps in operation; fewer pumps operate in the colder months. Other factors such as periodic unit outages can result in changes to intake flow; these types of outages are typically performed in the colder weather months when the customer demand for electricity is lower.

Debris Removal System Operations
Section 2 of the Characterization Report provides a description of the debris removal system components for each screenhouse. These components consist of a skimmer wall, trash racks and traveling screens. Debris is removed from these components as needed to maintain efficient CWIS operations.

Changes in Operation to Reduce Intake Flows or IM and E
Per Section 2.2.5 of the Characterization Report "A fish rescue (pump) system that had been installed several years ago is no longer operating because of its deteriorated condition." The exact date that this system became inoperative is not known, but it has been 10 or more years ago. There have been no other changes to reduce intake flows or IM and E.

Supplemental Information – Cooling Water System (CWS) Operation

Hours of Operation
As stated above, MONPP operates every day of the year, 24 hours per day. The CWS must be in operation when the plant is operating.

Seasonal Changes in Operation
The same seasonal changes stated above apply to the CWS. Section 2 of the Characterization Report describes the intake circulating water pumps, and seasonal changes in CWS operation consist of reducing the number of pumps running from three per unit to two. In addition, there

are a total of six general service water (GSW) pumps that provide a variety of functions for the plant. A portion of the GSW is used for non-contact cooling of various equipment such as coal mills and fans.

Anticipated Changes in Operation

There are no anticipated changes in CWS operation at this time.

ENCLOSURE 2

Velocity Calculations

Supplemental Information – Intake Velocities

Calculations

Intake canal velocities were calculated for the following locations:

V_1: Entrance to Intake Canal from the River Raisin
V_2: Entrance to Screen House #1 after the trash racks
V_{3a}: Approach velocity at Screen House #1 (each screen)
V_{3ts}: Through screen velocity at Screen House #1 (each screen)
V_4: Narrowed intake canal area to Screen House #2
V_5: Entrance to Screen House #2 after the trash racks
V_{6a}: Approach velocity at Screen House #1 (each screen)
V_{6ts}: Through screen velocity at Screen House #1 (each screen)

These locations, as well as the calculations, are provided on the attached pages. Here are the calculated velocities:

V_1 = 1.38 ft/sec
V_2 = 0.78 ft/sec
V_{3a} = 0.93 ft/sec
V_{3ts} = 1.31 ft/sec
V_4 = 2.1 ft/sec
V_5 = 0.78 ft/sec
V_{6a}= 0.93 ft/sec
V_{6ts} = 1.31 ft/sec

These calculated velocities compare favorably with those values provided on Figure 2-6 of the Characterization Report.

SPONSELLER GROUP, INC.

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ENGINEERING DATA

Sheet 1 Of 3 By: NJC

Date 1/13/15 Due:

Project MON PP - SUPPLEMENTAL DATA FOR NPDES APPLICATION Job # By: N. CHUEY

Description WATER VELOCITY @ INTAKE CANAL LOCATIONS

Revision ____ Date ____

DATA

- Max. Intake Flow: 1,428,000 GPM or 3,184 CFS (ft^3/sec)
  (Ref: Characterization Report by Golder, Pg 8 - July 2008)
- Max Intake Flow per Screen House: 1,592 CFS (3,184 CFS ÷ 2)
- Max Intake Flow per Screen: 199 CFS (1,592 CFS ÷ 8)
- No. of Screen Houses: 2 No. of screens per screen House: 8
- Intake Canal Dimensions: See attached Fig. 1
  (Ref: Screen House Unit M-1 document, Fig 1)
- Water Level Elevations:
  - Low Water Datum: 567.2' Above Mean Sea Level (AMSL)
    (Ref: Characterization Report by Golder, Fig. 2-6 - July 2008)
- Bottom of Intake Canal Elevations:
  - 546.0' AMSL * Elevation of the base at the Screen Houses
    (Ref: Dwgs 6M695A-7 & 6C695A-12)

    NOTE: This elevation is used for all the locations where water velocity is calculated
- Screen House Side View: See attached Fig. 2

CALCULATIONS

V = Intake Flow ÷ Intake cross sectional Area
(Ref: EPRI Report, December 2000)

Note: Refer to the attached Fig. 1 for velocity locations

- V_1: Entrance to Intake Canal From the River Raisin

$$V_1 = 3{,}184\ ft^3/sec \div \left(\underbrace{(567.5' - 546.0')}_{(21.5')} \times 107'\right)$$

$$\boxed{V_1 = 1.38\ ft/sec}$$

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ENGINEERING DATA

Date 1/13/15 Due: ______

Job # By: N. CHUEY

Project MONPP - SUPPLEMENTAL DATA FOR NPDES APP.

Description WATER VELOCITY @ INTAKE CANAL LOCATIONS

Revision ______ Date ______

- V_2: Entrance to Screen House #1 after Trash Racks

$V_2 = 1{,}592\ ft^3/sec \div (21.5' \times 94.4')$

$\boxed{V_2 = 0.78\ ft/sec}$

NOTE: 94.4' is the effective opening @ the trash racks - Dwg 6C695A-11

- V_{3a}: Approach Velocity @ Screen House #1 (each Screen)

$V_{3a} = 199\ ft^3/sec \div (21.5' \times 10')$

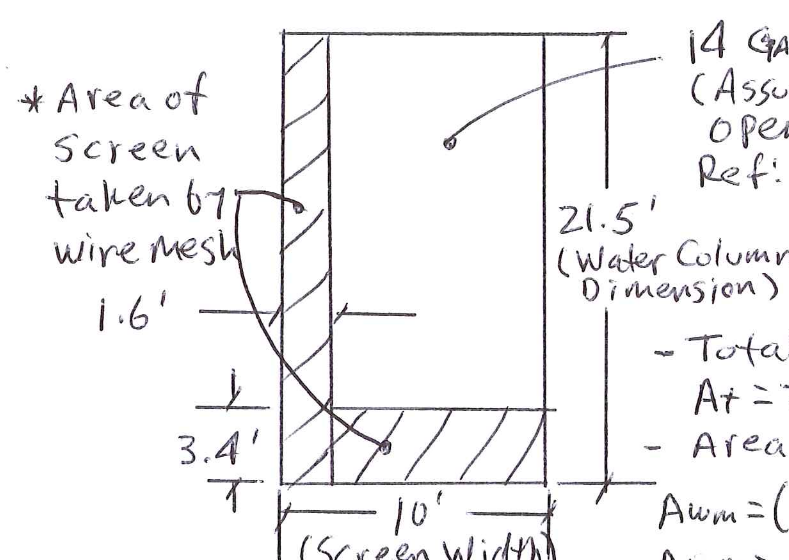
$\boxed{V_{3a} = 0.93\ ft/sec}$

NOTE: Each Screen is 10' wide Characterization Report, Pg. 7

- V_{3ts}: Through Screen velocity @ Screen House #1 (each Screen)

V_{3ts} = Intake Flow ÷ Effective Screen open area

Typ. Screen for SH #1 - 8 total



14 GAUGE WIRE CLOTH (Assumed) x 0.375" opening
Ref: Charac. Report, Pg 7

- Total Screen Area (A_T)
$A_T = 21.5' \times 10' = 215\ ft^2$
- Area taken by wire mesh (A_{wm})
$A_{wm} = (1.6' \times 21.5') + (3.4' \times 8.4')$
$A_{wm} = 63\ ft^3$
- Net open Area (A_n)
$A_n = 215\ ft^2 - 63\ ft^2$
$A_n = 152\ ft^2$

$V_{3ts} = 199\ ft^3/sec \div 152\ ft^2$

$\boxed{V_{3ts} = 1.31\ ft/sec}$

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ENGINEERING DATA
Sheet 3 Of 3 By: NJC
Date 1/13/15 Due:
Job # By: N. CHUEY
Revision ___ Date ___

Project MONPP- SUPPLEMENTAL DATA FOR NPDES APP.
Description WATER VELOCITY @ INTAKE CANAL LOCATIONS

• V_4 : Narrowed Intake Canal Area to Screen House #2

• $V_4 = 1{,}592\ ft^3/sec \div (21.5' \times 36')$

$\boxed{V_4 = 2.1\ ft/sec}$

• V_5: Entrance to Screen House #2 after Trash Racks

$V_5 = 1{,}592\ ft^3/sec \div (21.5' \times 94.4')$

$\boxed{V_5 = 0.78\ ft/sec}$ * See Note for V_2

• V_{6a}: Approach velocity @ Screen House #2 (each Screen)

$V_{6a} = 199\ ft^3/sec \div (21.5' \times 10')$

$\boxed{V_{6a} = 0.93\ ft/sec}$ * See Note for V_{3a}

• V_{6ts}: Through Screen Velocity @ Screen House #2 (each screen)

$V_{6ts} = 199\ ft^3/sec \div 152\ ft^2$

$\boxed{V_{6ts} = 1.31\ ft/sec}$ * See Notes for V_{3ts}

ASSUMPTIONS

- The low water datum shown on pg. 1 provides a conservative value when calculating velocities.
- Through-screen velocities are based on screens that completely free of debris.
- Conversion Factors:
  * 1 GPM = 0.00223 CFS

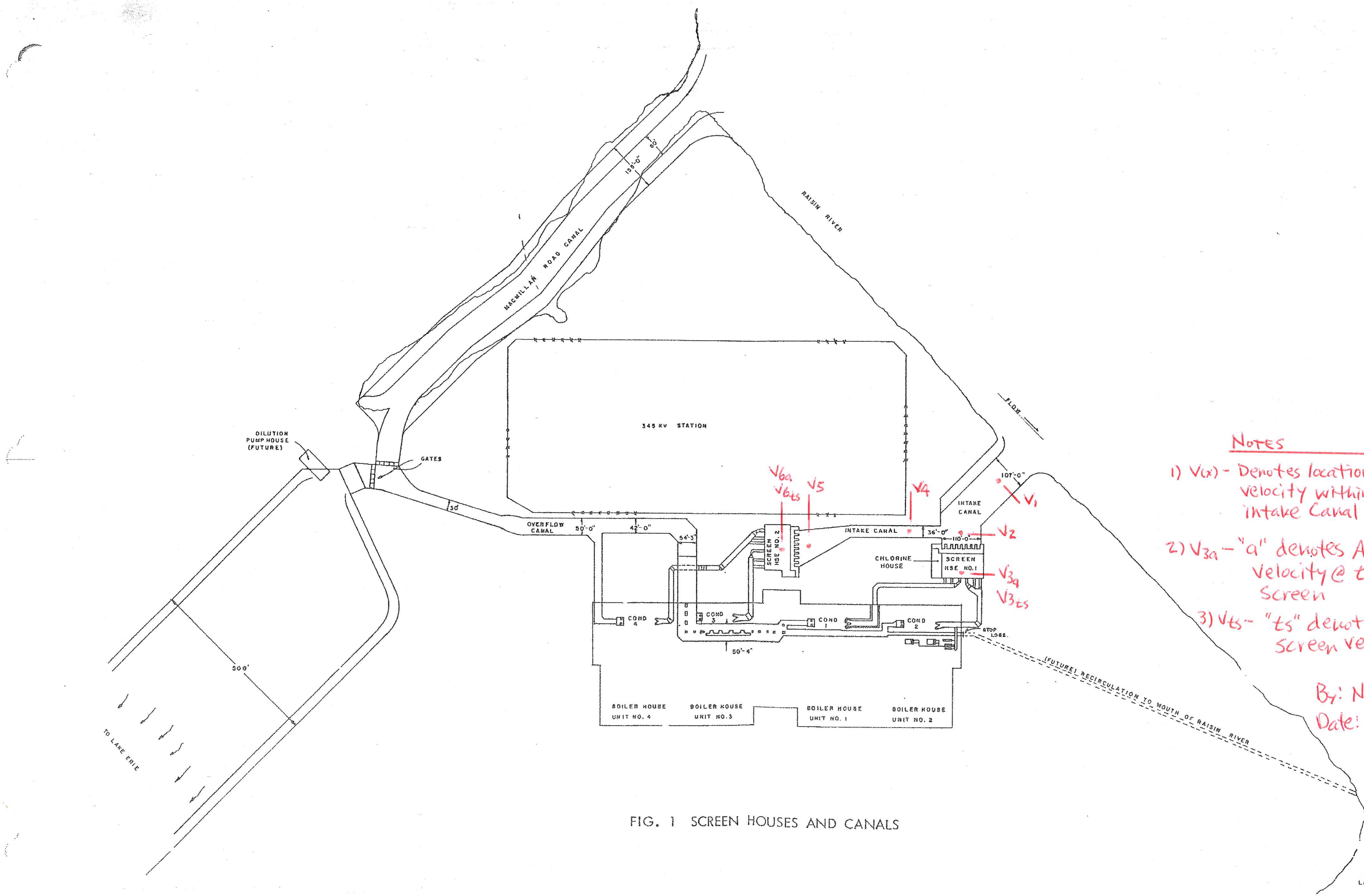

FIG. 1 SCREEN HOUSES AND CANALS

Notes

1) V(x) - Denotes location of water velocity within the intake Canal

2) V_{3a} - "a" denotes Approach velocity @ the intake Screen

3) V_{ts} - "ts" denotes through screen velocity

By: N. Chuey
Date: 1/13/2015

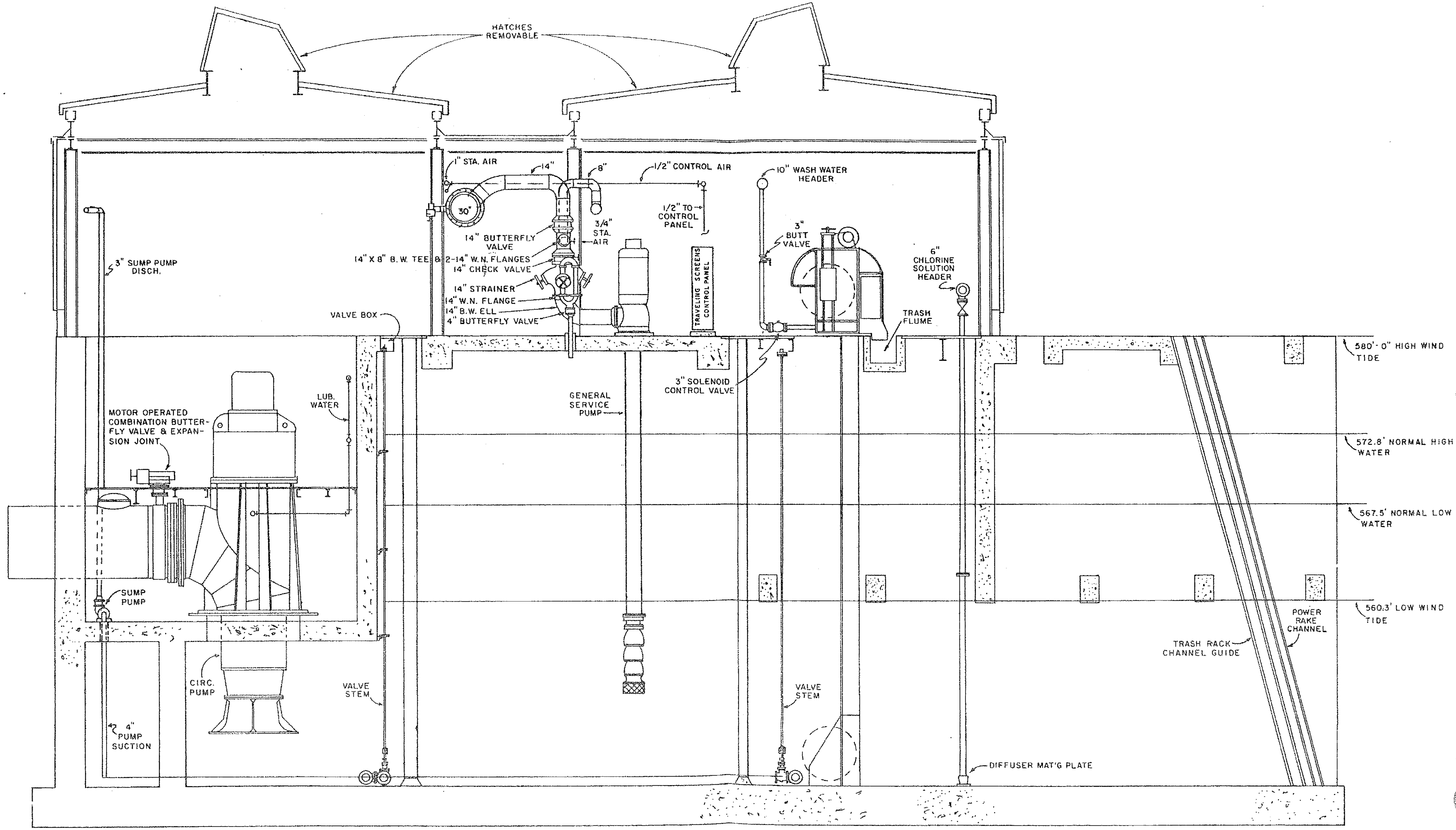

FIG. 2 SCREEN HOUSE, SIDE VIEW